PATENT SPECIFICATION

752,796

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COMPLETE SPECIFICATION

Improvements in or relating to Caps or Lids for Bottles and Like Containers

I, CARL-OLOV ROSEN, of Halsingegatan 35, Stockholm, Sweden, and of Swedish Nationality, do hereby declare the invention for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement :—

This invention relates to a cap or lid for bottles and other receptacles or tanks particularly of the type adapted for containing partly a liquid and partly a gas under pressure, such as bottles for effervescent beverages and tanks for liquids having a low boiling point, particularly liquid fuels such as petrol.

The main object of the invention is to provide a cap or lid which is capable of withstanding a relatively high internal pressure in the container to be closed and which at the same time is readily attachable and detachable without screwing or like troublesome manipulation.

Another object of the invention is to provide a cap or lid of the type defined which is adapted for repeated use and which is simple in construction and economical in manufacture but nevertheless reliable and useful for diverse types of containers.

A further object of the invention is to provide a cap or lid for liquid containers and particularly a petrol tank filler cap which incorporates means admitting air into the container to avoid vacuum therein if liquid is drawn from the container through a second outlet such as in a fuel tank of a motor vehicle wherein the fuel is successively consumed by the internal combustion engine.

The cap or lid according to the invention is adapted to be used in connection with such bottles, tanks or like containers which, in a manner known *per se*, are provided with a neck or sleeve-like projection for receiving the cap or lid, said neck or projection having an external annular flange or bulge surrounding the orifice and forming a seat for the closure member.

The closure device according to the invention is adapted for use on such neck openings and comprises an outer cap member of substantially rigid material having a sleeve-like side wall, a top for covering the opening to be closed and an annular, inwardly directed flange near its open end, and an elastic lining member removably mounted in compression in the outer cap member and retained against the inner face of the side wall thereof by the inwardly directed flange and by the restitutional force in the elastic member urging it outwardly, the internal diameter of the lined cap in the operative position being less at the open end than at the inner end of the cap so that the lining member will be subjected to radial pressure so as to be compressed between the neck bulge of the container and the side wall and the inwardly directed flange of the outer cap member.

In order that the invention may be more clearly understood, several embodiments thereof will be described by way of example with reference to the accompanying drawings in which :—

Fig. 1 is a sectional elevation of an outer cap member of a first embodiment of a bottle closure according to the invention;

Fig. 2 shows the complete closure as viewed from below in Fig. 3;

Fig. 3 is a sectional elevation similar to that of Fig. 1 further showing an annular elastic lining inserted in the cap member; and

Fig. 4 shows a section elevation of the complete closure member when attached to a bottle;

Fig. 5 is a sectional elevation of a second embodiment of a bottle closure cap according to the invention; and

Fig. 6 shows a sectional elevation of the closure member according to Fig. 5 when attached to a bottle; while

Figs. 7, 8, 9, 10, 11 and 12 show, in sectional elevation, various forms of an elastic

lining for the closure member shown in Figs. 5 and 6;

Fig. 13 is a sectional elevation of a petrol tank filler cap including air admitting means;

Fig. 14 shows a sectional elevation of the cap according to Fig. 15 when attached to a petrol tank;

Fig. 15 is a sectional elevation similar to that of Fig. 14 and illustrating the operation of the air admitting means;

Fig. 16 shows a sectional elevation of a first modification of the tank cap shown in Fig. 13; and

Fig. 17 is a sectional elevation of a second modification of the tank cap.

Referring first to Figs. 1 to 4 showing the first embodiment of the cap according to the invention, the bottle closure comprises an outer cap-like member of rigid material such as metal, synthetic resin or the like and having a conically tapering side wall 1, a top 2 and an inturned flange 3 at its lower, narrower end. Inside this flange 3 there is provided a substantially cylindrical lining ring 4 of rubber or like elastic material (Fig. 3) said lining ring having a radial thickness exceeding the radial dimension of the flange 3 and preferably also a height exceeding the distance between the flange 3 and the top 2 so as to be slightly deformed under compression both radially and axially as shown in Fig. 3 when properly located in the outer cap-like member. The ring 4 will however exert an outward radial pressure on the wall 1. The outer cap-like member has an externally projecting, rigid lip or ear 5 facilitating detachment of the closure member and having its under side substantially flush with the internal flange 3. As will appear from Fig. 1 the side wall 1 of the outer cap-like member is conically tapered towards the lower open end, and the degree of taper indicated at 6 should be between 3° and 8°, preferably about 5°.

Fig. 4 shows the closure member attached to the opening of a bottle 7 of conventional type having an external annular flange or bulge 8 around its orifice. The bottle 7 is supposed to contain an effervescent beverage giving off carbon dioxide with a certain pressure acting on the closure cap as indicated by the arrows 9. When the cap is pressed down over the opening of the bottle, the elastic lining ring 4 will readily admit the bulged top of the bottle neck because it is then slightly deformed and compressed towards the upper, wider part of the outer cap member. The lining ring 4 will then fit tightly between the bottle neck bulge 8 and the outer cap shell, and the internal gas pressure in the bottle will aid to press down the lining ring around the bottle neck bulge as soon as the attaching pressure on the cap ceases while the cap will be slightly lifted by the internal pressure in the bottle, so that the bottle will be very reliably closed as shown in Fig. 4, wherein the lining ring 4 is subjected to radial pressure so as to be compressed between the downwardly inclined face of the bulge 8 and the flange 3 and tapered side wall 1 of the outer cap member.

The closure member may be easily detached from the bottle by applying a pressure to the under side of the lip 5 whereby the cap is slightly tilted causing a further compression of the lining ring 4 opposite to the lip and the formation of an outlet opening for the gas just inside the lip. By a further pressure the cap is bent away from the bottle without being in any way deformed or otherwise damaged. Consequently the detached cap is immediately ready for repeated use.

Though the cap just described is very useful, reliable and yet structurally simple, it has certain disadvantages particularly from the manufacturer's point of view because its side walls 1 are tapered.

Furthermore, it is not always satisfactory, from hygienic or other view points, to expose the inside of the outer cap member to the contents of the bottle or container to be closed or to let the gas or liquid enter between the lining ring and the outer cap member where matter may be deposited and foul the contents of the container. Therefore, a modified embodiment of the cap or lid according to the invention has been developed and has found an extensive use for various liquid containers.

This second cap or lid is shown in Figs. 5 to 12 and comprises an outer cap member having a cylindrical side wall 10, a top 11 and an internal flange 12 at its lower end or edge. The outer cap member is further provided with an external, annular flange 13 serving as a finger grip when detaching the cap from the bottle. The elastic lining of the closure member is in Figs. 5, 6, 7, 9 and 11 formed as an inverted cup covering the mouth of the bottle and having a sleeve portion 14 and a top portion 15. The sleeve portion 14 of this lining has an annular groove 16 in its outer side near the lower edge thereof (see particularly Fig. 7) which facilitates proper bending of the lining upon insertion in the outer cap member after compressing it against its restitutional force. As will appear from Fig. 8 the cup-like lining may be replaced, if desired, by an annular sleeve-like lining having no top portion. Figs. 9 to 12 show other forms of lining which may be used in combination with the outer cap member illustrated in Fig. 5. In all constructions of the lining it is always under compression when located in the outer cap member.

The main difference between this second cap and the closure member described with reference to Figs. 1 to 4 is that the side wall 10 of the outer cap member is cylindrical instead of conically tapered and that, at the

same time, the elastic lining has a sleeve portion internally tapering—between 3° and 8° for the angle 18 in Fig. 5—towards the open end of the closure member when properly assembled with the outer cap member as shown in Fig. 5. Thereby the cap according to Fig. 5 will function in the same way as above-described with reference to the cap shown in Fig. 3 as will also be apparent from Fig. 6 where it is attached to a bottle and acted upon by an internal pressure as indicated by the arrows 9. The lining will be compressed between the bulge 17 of the bottle neck and the side wall of the outer cap member thus keeping the bottle tightly closed. The higher the pressure in the bottle the more tightening pressure between the bottle and the cap. Yet the cap is very easily detached by a local pressure applied to the under side of the flange 13.

In Figs. 13 to 15 there is shown a first form of a petrol tank filler cap generally similar to the cap shown in Fig. 5 but having a lining substantially of the type as illustrated in Fig. 11. This latter cap comprises an outer cap member, preferably metallic, having a side wall 19, a top 20 and an inturned flange 21 at its lower end, the side wall having an annular external flange or ridge 22 serving as a finger grip, and a cup-like lining of elastic material such as synthetic rubber having an internally tapered sleeve-portion 23 and a top 24, and compressed when located in the outer cap member.

Since the fuel to be contained in the tank is successively consumed there may occur a vacuum in the tank, rendering difficult the removal of the fuel through the carburettor line, the cap has been provided with means for admitting air into the tank under conditions of lowered pressure therein. Such means comprise a central valve wart 25 on the upper side of the lining top 24, an opening 26 in the top of the outer cap member, which opening will be normally closed by the wart 25, and a second opening 27 in the lining top 24 laterally of the wart 25. As long as the pressure in the tank 29, to the bulged neck 28 of which the cap is attached as in Figs. 14 and 15, is the same as or higher than the external pressure, the opening 26 will be kept closed by the wart 25 but as soon as the pressure within the tank becomes lower than the external pressure, the lining top 24 will be sucked down like a diaphragm withdrawing the wart 25 from the top 20 of the outer cap member, whereby air is readily admitted through both openings 26 and 27 as illustrated in Fig. 15.

In Fig. 16 there is shown a modified form of the petrol tank filler cap just described, wherein the wart on the lining top has been dispensed with, and wherein the top 20 of the outer cap member has been provided with an internal central projection 30 through which the air entrance opening 31 is bored. The bored projection 30 will thus form a direct seat for the lining top 24 and the structure will operate in the same manner as before described. All other details of this cap are similar to those above-described with reference to Figs. 13 to 15.

Fig. 17 shows a further modified embodiment of the petrol tank filler cap with air admitting means, the top 32 of the outer cap member being here concave and having an eccentrically located hole 33, while the elastic lining top 34 has a centrally located hole 35 normally closed by the bottom of the cap member top. Even here the lining top serves as a diaphragm opening the air inlet passage through the holes 33 and 35 as vacuum conditions.

It should be mentioned that the fact that air is admitted through the cap when vacuum occurs in the container does not influence on the capability of the cap to remain in tightening position because the cap should always be so dimensioned relatively to the externally bulged neck of the container that the lining compressed within the cap is subjected to an outwardly directed radial force when the cap is attached and every increase of the internal pressure of the container, within certain limits, of course, will cause the cap to wedge more reliably on the container.

It should be pointed out that the above-described air admitting means may be provided also in a cap of the type shown in Fig. 3 if the latter is provided with a cup-like lining as will be readily understood by those skilled in the art.

What we claim is :—

1. A cap or lid for a bottle, tank or like container having an open ended neck portion with an external annular bulge around its opening edge and adapted to contain gas under pressure or other materials, comprising an outer substantially rigid cap member having a sleeve-like side wall, a top for covering the opening to be closed, and an annular, inwardly directed flange near its open end, and an elastic lining member removably mounted in compression in the outer cap member and retained against the inner face of the side wall thereof by the inwardly directed flange and by the restitutional force in the elastic member urging it outwardly, the internal diameter of the lined cap in the operative position being less at the open end than at the inner end of the cap so that the lining member will be subjected to radial pressure so as to be compressed between the neck bulge of the container and the side wall and the inwardly directed flange of the outer cap member.

2. A cap or lid according to Claim 1, characterised in that the lining member is formed as an inverted cup having a top covering the inside of the top of the outer cap member.

3. A cap or lid according to Claim 2, characterised in that the top of the outer cap member and the top of the lining are both provided with mutually displaced air inlet holes, the top of the lining serving as a diaphragm co-operating with the top of said outer cap member for normally closing one of said holes.

4. A cap or lid according to any of the preceding claims, characterised in that the side wall of the outer cap member conically tapers towards the open, flanged end of the cap member.

5. A cap or lid according to any of the preceding claims, characterised in that the lining member has a sleeve portion inside the side wall of the outer cap member, said sleeve portion having a radial thickness increasing towards the open end of the cap member.

6. A cap or lid according to any of the preceding claims, characterised in that the outer cap member has an externally projecting finger grip means on its side wall for applying a local detaching pressure.

7. A cap or lid substantially as described herein and as illustrated in Figs. 1 to 4, 5 and 6, 7 to 12, 13 to 15, 16 and 17 of the accompanying drawings.

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Fig. 1

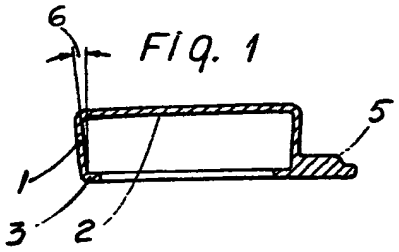

Fig. 3

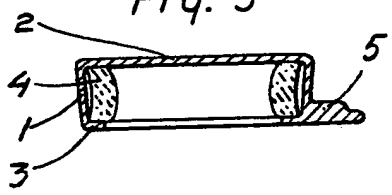

Fig. 2

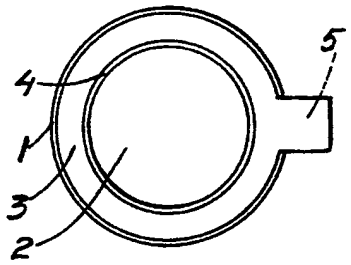

Fig. 4

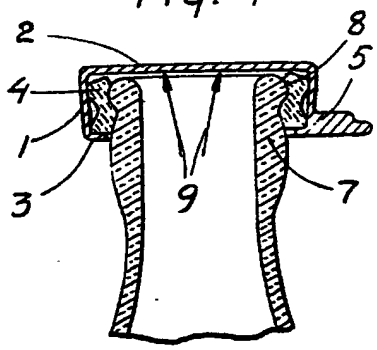

Fig. 5

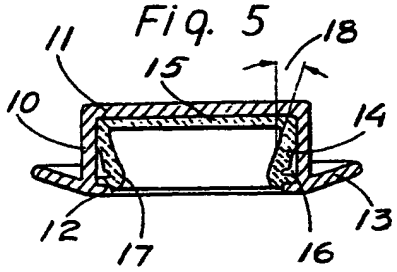

Fig. 7

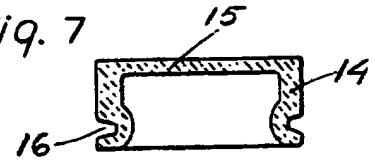

Fig. 8

Fig. 6

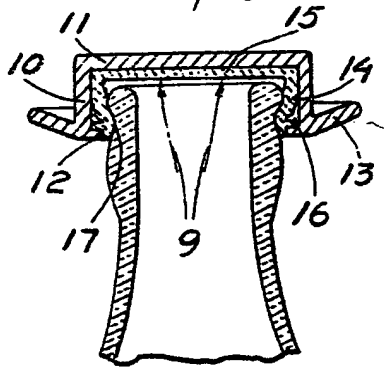

Fig. 9

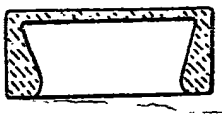

Fig. 10

Fig. 11

Fig. 12

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2 SHEETS

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SHEETS 1 & 2

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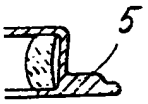

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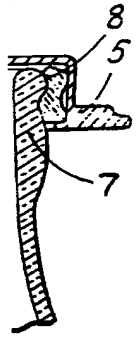


Fig. 10

Fig. 12

Fig. 13

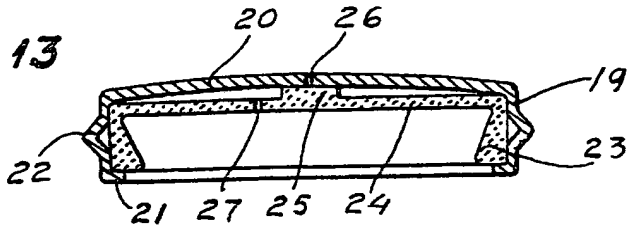


Fig. 14

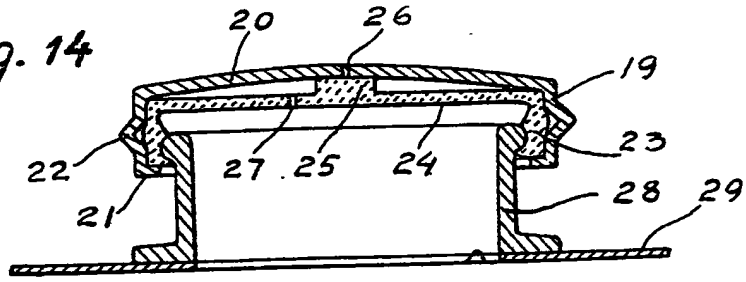


Fig. 15

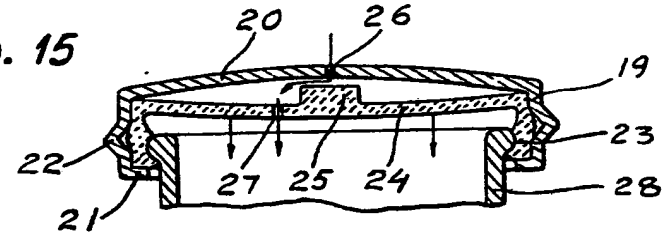


Fig. 16

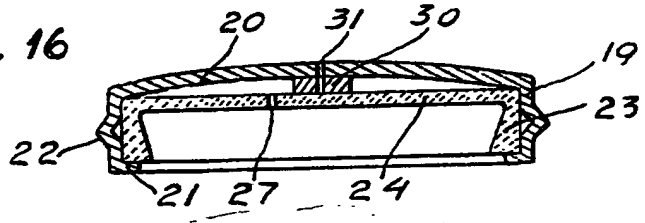
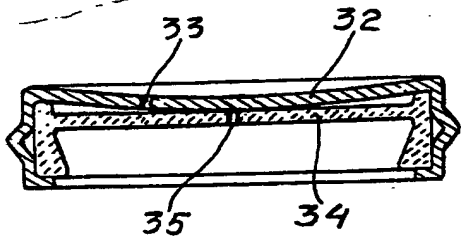


Fig. 17



752,796 COMPLETE SPECIFICATION
2 SHEETS This drawing is a reproduction of the Original on a reduced scale.
SHEETS 1 & 2

Fig. 1

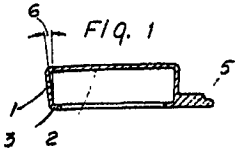


Fig. 2

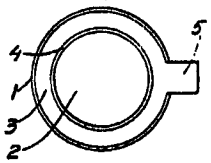
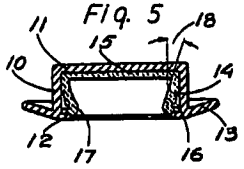


Fig. 5



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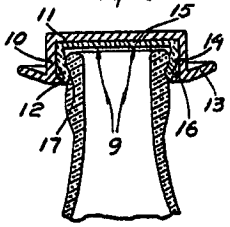
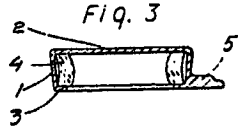


Fig. 3



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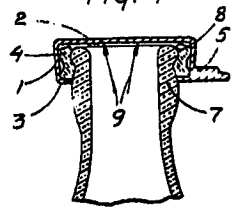

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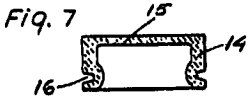


Fig. 8

Fig. 9

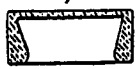


Fig. 10

Fig. 11

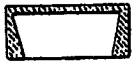


Fig. 12

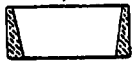
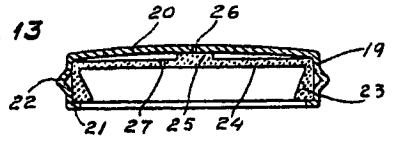


Fig. 13



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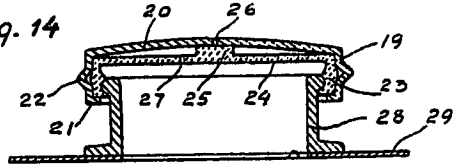

Fig. 15

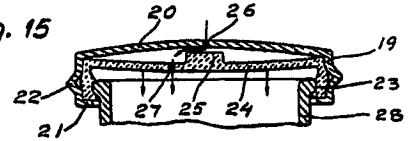

Fig. 16

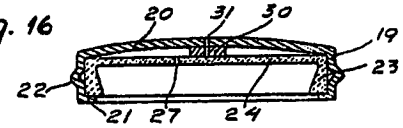

Fig. 17